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UNIVERSITY OF BAHRAIN COLLEGE OF INFORMATION TECHNOLOGY
DEPARTMENT OF COMPUTER SCIENCE SUMMER SEMESTER 2013
ITCS242: ASSEMBLY PROGRAMMING FIRST TEST DATE: JULY 22, 13

QUESTION ONE: Write a complete assembly program that:

[16 pts]

- Defines an array NAF consisting of 36 elements of signed double words.
- Randomly generate 36 double words and store the generated values in array NAF.
- Displays on the screen all double words of array NAF in binary one value per line.
- Swaps the two words in each array element.
- Displays in HEX all elements of array NAF as words separated by a space.

```
INCLUDE Irvine32.inc
.DATA
NAF SDWORD 36 dup(?)

.CODE
MAIN PROC
CALL RANDOMIZE
; Generating random numbers and storing them in array NAF
MOV ESI, OFFSET NAF
MOV ECX, LENGTHOF NAF
L0: CALL RANDOM32
MOV [ESI], eax
ADD ESI, 4
LOOP L0
CALL CRLF
; Display ARRAY NAF as double words in binary ONE VALUE PER LINE
MOV ECX, LENGTHOF NAF
MOV ESI, 0
L2: MOV EAX, NAF[ESI]
CALL WRITEBIN
CALL CRLF
ADD ESI, 4
LOOP L2
CALL CRLF
; Swapping the words in each double word
MOV ESI, 0
MOV ECX, LENGTHOF NAF
L9: MOV AX, WORD PTR NAF[ESI]
XCHG AX, WORD PTR NAF[ESI+2]
MOV WORD PTR NAF[ESI], AX
ADD ESI, 4
LOOP L9
; Display elements of array NAF as words (HEX) separated by space
MOV ESI, OFFSET NAF
MOV EBX, TYPE NAF / 2
MOV ECX, LENGTHOF NAF * 2
CALL DUMPHEX
CALL CRLF

EXIT
MAIN ENDP
END MAIN
```

QUESTION TWO:

{12 points}

Choose the BEST correct answer for each of the following questions and **write its letter symbol down in the table shown below**

- 1) The statement that produces syntax error during assembly process is:
 a) MOV AX, [EBX] b) MOVZX EBX, CL c) INC AX
 d) MOV [EBX], [EAX] e) MOV DH, 20H
- 2) The instruction that stores 0 in the memory word pointed by esi register is:
 a) MOV esi, 0 b) MOV [esi], 0 c) SUB [esi], [esi]
 d) SUB esi, esi e) None
- 3) The statement that produces syntax error during assembly process is:
 a) ADD EAX, EBX b) SUB EAX, 20H c) XCHG AX, BX
 d) SUB [EBX], AX e) None
- 4) If a PC has 24 data lines and 8GB of main memory, the minimum number of address lines is
 a) 8 b) 33 c) 32 d) 64 e) None
- 5) The register the must be used to store the loop repetition counter when using LOOP instruction is:
 a) ECX b) EBX c) ESI d) EIP e) None
- 6) The type of the SOURCE operand used in the instruction: MOV BX, sizeof HI; is:
 a) Immediate b) Direct c) Indexed d) indirect e) None
- 7) If the physical address is 40000H and the offset value is 39C0, then the segment value will be:
 a) 4C64 b) 4C640 c) 3C64 d) 3C640 e) None
- 8) The instruction that subtracts the contents of CX register from the word pointed by ebx register is:
 a) SUB CX, [EBX] b) SUB ebx, CX c) SUB [ebx], CX
 d) SUB WORD PTR EBX, CX e) None
- 9) The 8-bit value 10001010 represents unsigned decimal value ____ and signed decimal value ____
 a) -138, 118 b) 138, -118 c) 138, -138 d) 118, -118 e) None
- 10) The directive that defines an array OUR consisting 0f 24 signed bytes all initialized with -50 is:
 a) OUR sbyte 24 dup(-50) b) OUR sdword 24 dup(-50)
 c) OUR sword 24 dup(0A0H) d) OUR sbyte 24 dup("-50") e) None
- 11) The step in the instruction cycle that determines where to store the result is:
 a) STORE RESULT b) INSTRUCTION DECODE c) NEXT INSTRUCTION
 d) OPERANDS FETCH e) None
- 12) The statement that produces syntax error during assembly process is:
 a) INC AX b) MOVZX EBX, CL c) ADD AX, BX
 d) MOV SX EBX, EAX e) MOV DH, 20H

Question #	1	2	3	4	5	6	7	8	9	10	11	12
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Answer	D	E	E	B	A	A	C	C	B	A	B	D
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QUESTION THREE:

{15 points}

- (a) Given: U sdword 7F2C0987H, 5A3B4EH, ...; Write **NO more than 4 instructions** to display all values in U in hexadecimal as bytes separated by ONE space.

```
MOV    ECX, SIZEOF U
MOV    EBX, TYPE U /4
LEA    ESI, U
CALL   DUMPMEM
```

- (b) Given: U sword 44 dup(?); Write **NO more than 5 instructions** to fill the 2 bytes in each word of array U with -4 and +4.

```
MOV    ECX, LENGTHOF U
MOV    EBX, 0
L2: MOV    U[EBX], 0FC04H
ADD    EBX, 2
LOOP   L2
```

Given the following data definitions:

```
        sword    20 dup ( ? )
U        sword    64 dup (3A7CH)
```

- (c) Write **NO more than 7 instructions** to move ALL words of U up in the memory for 40 bytes. (Not allowed to change the values in U).

```
MOV    ECX, LENGTHOF U
MOV    EBX, 0
L6: MOV    AX, U[EBX]
MOV    U[EBX-40], AX
ADD    EBX, 2
LOOP   L6
```


QUESTION FOUR:

[10 pts]

- (a) Assume UU is a predefined signed memory word, Give NO more than **3 instructions** to perform the following: $EBX = AX - UU * 2$

```
SUB    AX, UU
SUB    AX, UU
MOVSX  EBX, AX
```

- (b) Given: FOO QWORD ?; Give NO more than **3 instructions** to swap the 2 dwords in FOO.

```
MOV    ECX, DWORD PTR FOO
XCHG   ECX, DWORD PTR FOO+4
MOV    DWORD PTR FOO, ECX
```

- (c) Carefully study the following data definitions and instructions then choose the BEST correct answer for each of the following 4 questions.

```
T1  BYTE    11H, 22H, 7FH, 9AH, 2 dup(?)
T2  WORD     ?, 6F7FH, 6ACAH, 814AH, 69CFH, 12A8H
UT  DWORD    5A3C7F98H, 56F14BH, 69CB3A2CH, 248F7C39H
RT  EQU      $-T1

MOV    BX, WORD PTR T1
MOV    AX, WORD PTR UT+2
MOV    DX, WORD PTR UT-6
MOV    CH, SIZEOF T2
MOV    CL, LENGTHOF UT
```

After executing the above instructions,

- 5) The register DX will contain:
a) 4ACAH b) CA4AH c) **814AH** d) 4A81H e) None
- 6) The register CX will contain:
a) 0405H b) 0C05H c) Unknown d) 040AH e) **None**
- 7) The value assigned to the constant name RT is:
a) 16 b) 20H c) 34H d) **34** e) None
- 8) The register AX will contain:
a) **5A3CH** b) 5A3EH c) 7F9AH d) F14BH e) None